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Subject: Fw: Diesel Cleans Up Its Act for an Encore (New York Times)
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Deliberative Process / Ex. 5

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Subject: Diesel Cleans Up Its Act for an Encore (New York Times)

Diesel Cleans Up Its Act for an Encore (*New York Times*)

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By LAWRENCE ULRICH
AFTER years in the automotive wilderness, largely exiled to the smoky borders of truck stops, diesel is coming home. Americans may not recognize its freshly scrubbed face.

A 19th-century invention by Rudolf Diesel, the diesel engine has always been known for outstanding fuel efficiency, with better mileage (by 25 percent to 40 percent) than gasoline. But the kerosenelike fuel and the engines that burn it were dirty, noisy, dawdling and even deadly, linked to increased risk of cancer and respiratory disease.

That has all changed, in part because of cleaner-burning fuel -- its 2006 rollout had been mandated in 2000 by the Clinton administration -- that has 97 percent less of the sulfur responsible for diesel engines' sooty particulates.

The low-sulfur fuel, hailed by the Environmental Protection Agency as a historic advance, has opened the door to sophisticated emissions controls that let diesel engines meet the strict pollution standards of California. Those rules, the world's most stringent by far, require 2009-model diesels to be as green as gasoline or even hybrid models.

In the meantime, advances like turbocharging and high-pressure fuel injection have transformed diesel cars from soot-belching slowpokes with a telltale clickety-clack

sound to smooth, tidy and powerful machines that many Americans would have a hard time distinguishing from gasoline models.

With technical and environmental hurdles overcome -- and facing tougher mileage standards that call for a 35 m.p.g. average by 2020 -- automakers are rushing in with clean-diesel cars.

Two sets of emissions rules -- a very strict set for California and four other states, another for the remaining 45 states -- had kept most diesel cars out of the United States until now. In contrast, fuel-sipping diesels were embraced in Europe, where they account for half of passenger car sales.

But starting with the 2009 model year, several automakers have developed diesels clean enough to pass muster in all states, including -- at last -- the big California and New York markets.

Volkswagen says it will be the first to market, with Jetta sedans and wagons arriving in August. Mercedes will follow in October with diesel versions of its GL-, ML- and R-Class sport crossover utilities. BMW is preparing a mighty twin-turbo 6-cylinder diesel for sale this fall in the 335d sedan and X5 35d sport wagon.

Audi's Q7 3.0 TDI utility wagon goes on sale early next year. That automaker has been vividly demonstrating modern diesel's one-two punch by dominating recent runnings of the 24 Hours of Le Mans with its R10 racers, which are not only fast, but are the quietest, cleanest and most fuel-efficient cars in the field.

The new diesel disciples are not just the usual German suspects. Three Japanese companies -- Honda, Nissan and Subaru -- are ramping up the technology. Long known for efficient gasoline engines, Honda will offer its first American diesel next year, as an option on the Acura TSX sedan. A similar diesel Honda from Europe that I recently tested achieved a wallet-friendly 53 m.p.g. on the highway.

Honda also plans to offer a diesel V-6 around 2010 that may find its way into the Acura TL sedan, the Acura MDX utility or the Honda Odyssey minivan.

Nissan will install a Renault-designed diesel in its Maxima sedan for 2010; Subaru will counter with a diesel the same year, probably in a Legacy sedan or Outback wagon. A Jeep Grand Cherokee diesel arrives in 2009, and General Motors, Ford and Dodge all plan 50-state diesel versions of their light-duty pickup trucks in 2009 or 2010.

The situation seems to defy the conventional wisdom that saw diesel cars heading to history's scrapyard. As late as 1982, Mercedes relied on diesels for 80 percent of its American sales. But aside from their strong presence in heavy-duty trucks, diesels have been relegated to a small but loyal fringe.

The diesel revival takes its cues from Europe, where the engines power everything from tiny microcars to luxurious autobahn cruisers. Strikingly, hybrids have grabbed less than 1 percent of the European market. Yet automakers acknowledge that

mending diesel's foul reputation in the United States remains an enormous challenge.

Johan de Nysschen, executive vice president at Audi of America, estimates that diesels might eventually account for 15 percent of Audis sold here. But first, he said, Americans must learn that modern diesels are not only clean and fun to drive, but more efficient than hybrids for many consumers.

"In stop-and-go city driving like Manhattan, the hybrid is a good solution," Mr. de Nysschen said at the New York auto show this spring. "But we need to convey the message that hybrids are not the definitive solution."

Under the hood, there is little to distinguish diesel engines from those that burn gasoline. Both use pistons, valves and electronic fuel injection, but the differences go beyond the form of petroleum that goes in the tank. Today's gasoline engines ignite their fuel with a high-voltage spark; diesels, also known as compression-ignition engines, light the fire with the heat generated by squeezing the air in the cylinders to a far greater degree. This is one of their main advantages: a compression ratio of nearly 20:1, compared with a maximum of about 12:1 for gasoline. This means that diesel engines extract more power from their fuel.

The compression of a gasoline engine can't simply be cranked up higher -- the gasoline would burn erratically. Diesel fuel, a petroleum distillate, will tolerate those high cylinder pressures.

Another reason diesels get better mileage: the fuel contains 12 percent more energy a gallon.

Largely because they burn less fuel, the engines produce up to a third less carbon dioxide than gasoline models -- compelling some environmentalists to reverse their longstanding opposition. Diesel's drawback had been high levels of smog-forming nitrogen oxides and carcinogenic soot.

The greening of diesel involves the new ultra-low-sulfur fuel, cleaner-burning engines and a suite of emissions equipment.

Filters trap sooty particulates while catalysts use ammonia to convert nitrogen oxides into harmless nitrogen and water in the exhaust.

"There's a little chemical processing plant in there, and some pretty amazing chemistry," said Thomas Hinman, vice president for diesel technologies at Corning, a leading supplier of cellular ceramic filters for diesel engines.

For many models, including those from BMW, Mercedes and Audi, there is a catch: their S.U.V.'s will carry six- to eight-gallon tanks of urea, an ammonia-rich solution injected into the exhaust to neutralize smog-forming pollution.

And to ensure that consumers don't let the urea run dry, Mercedes is installing a dashboard alert that warns consumers when the urea level drops below one gallon.

From there, owners will be on a countdown until the tank is topped off: the cars will start just 20 more times before they cannot be operated. That countdown is a concession to federal regulators, who demanded technical assurances that these groundbreaking systems would work continuously to keep emissions below legal levels.

The smaller 4-cylinder VW and Honda diesels, in contrast, meet 50-state standards without requiring urea tanks that would have to be replenished every 12,000 miles or so.

Yet as automakers dress up diesel for its coming-out party, one unexpected development is threatening to spoil it. For decades, diesel fuel cost less than gasoline, amplifying the advantage of its higher mileage. But over the last year, diesel has soared to a record average of $4.33 a gallon nationwide, compared with $3.72 for regular gasoline.

George Peterson, vice president of the AutoPacific consulting firm, said that diesel cars traditionally offset their higher prices through both fuel savings and higher resale value. But higher-price diesel fuel puts both those financial incentives at risk.

"Given the price of diesel, you can't get the cars to pay you back, so it doesn't make as much sense," he said.

While diesel currently costs 16 percent more than gasoline, that premium is more than offset by mileage gains of 25 to 40 percent. Consumers would still save money with a diesel car, and they would fill it less frequently.

The Mercedes E320 diesel sedan, for example, can cover roughly 700 highway miles on a tank. Clean-diesel models may also become eligible for federal tax credits of up to $3,400.

Consumers will also pay more for diesel technology, with manufacturers estimating that diesel engines and emissions gear add from $1,500 to $3,500 to their costs for each car. Mercedes is charging only $1,000 extra for its diesel models, compared with the equivalent gasoline versions, though some analysts suggest that Mercedes is partly subsidizing diesels to win converts. Steve Keyes, a spokesman for Volkswagen, said the Jetta diesel sedan and sport wagon would cost less than $2,000 over the gas versions, a price that he said would cover the additional costs.

Automakers also note major differences between European and American markets. European nations have long subsidized diesel by taxing gasoline at higher rates. Additional taxes on large engines also drove consumers into small but relatively powerful diesels.

Finally, diesel isn't as widely available as gasoline, though 42 percent of service stations nationwide offer the fuel, according to the Diesel Technology Forum, a trade group.

Many analysts expect diesels to blow past hybrids in popularity. J. D. Power & Associates estimates that diesel will explode from its 3 percent market share to 11.5 percent by 2015, exceeding hybrids at 7 percent. Continued high diesel prices could force an adjustment in that projection.

"People will definitely get sticker shock at over $4 a gallon," said Mike Omotoso, the powertrain analyst at J. D. Power. "But we see the huge price gap between gasoline and diesel as a relatively short-term spike."

And as the industry hedges its bets on which fuels and technologies -- including gas-electric hybrids, diesels, plug-in hybrids and ethanol -- will catch on, some automakers are publicly at odds over diesel's chances.

General Motors' advanced propulsion strategy is to develop a full range of alternatives to gasoline, including hybrids, ethanol, hydrogen and its Chevrolet Volt plug-in electric car. As part of that strategy, G.M. is developing new diesels, including a 4.5-liter V-8 that it will offer on 2010 models of the Chevy Silverado and GMC Sierra pickups.

Yet while GM is already selling 1.3 million diesel models a year worldwide -- and is readying a diesel-powered Cadillac CTS for Europe -- it sees diesel's American future in pickups and S.U.V.s, not in affordable cars.

G.M. engineers say diesel can raise the mileage of a trailer-towing truck by 70 percent, making it a smart buy. But, they say, for a gasoline car that already gets 35 m.p.g., diesel's gains don't justify the added costs.

Some automakers prefer to squeeze higher mileage from gasoline-burning engines without the expense of diesel engines and emissions gear. "There's no question that we can get to the 35 m.p.g. standard with gasoline," said John Krafcik, Hyundai's vice president for product development.

As technologies vie for supremacy, the diesel-versus-hybrid debate has been especially fierce. But diesel devotees don't have to be hybrid haters, or vice versa. With petroleum expected to dominate the automotive landscape for several more decades, the hybrids and diesels that burn it are central technologies in the transition to alternative fuels and the drive against global warming.

As if to prove the point, some automakers are marrying diesel and hybrid for the best of both worlds. Mercedes has shown a diesel-hybrid prototype of its big S-Class sedan that the company estimates would achieve 44 m.p.g. VW has shown a 69 m.p.g. diesel-hybrid Golf, though Mr. Keyes said the technology was years away from production.

Johannes-Joerg Rueger, vice president for diesel engineering at Robert Bosch, a major manufacturer of diesel systems, said: "If you're looking at the carbon dioxide and mileage goals that have to be met, it doesn't really matter whether it's diesel or hybrid. Let the consumer choose."

Pros Mileage is 25 percent to 40 percent higher than gasoline. Carbon dioxide emissions are lower. Highway mileage and performance are better than hybrids'. High torque is well suited to large pickups and S.U.V.'s. Extended driving range means less frequent fill-ups. Engines are robust, often lasting 300,000 miles or more. Cons Engines and emissions systems can be costly. Diesel fuel currently costs far more than gasoline. Like gasoline, diesel is a petroleum product from foreign suppliers. Though outdated, image as a dirty technology lingers. Only 42 percent of American filling stations have diesel pumps. Some companies' latest emissions controls require refills of urea.

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